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A QUALITATIVE BIOLOGICAL SURVEY OF AQUATIC MACROPHYTES AND LARVAL, JUVENILE AND ADULT FISH OF THE UPPER ST. MARYS RIVER

FIELD RECONNAISSANCE REPORT

GREAT LAKES CONNECTING CHANNELS AND HARBOR STUDY

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U.S. Army Corps of Engineers
Detroit District

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This study was conducted in conjunction with the alternatives considered in the Great Lakes Connecting Channels and Harbors Study, to collect qualitative biological information in order to facilitate characterization of a 15-mile portion of the St. Marys River above the Sault Locks. This report presents the findings on aquatic macrophytes and larval, juvenile and adult fish of the study area. The results of this effort indicate that the habitats present in the upper St. Marys River have the capability to provide many varied life history requirements for many important fish and wildlife resources. (RW)

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PREFACE

The Fish and Wildlife Service (FWS) first became involved with the Great Lakes Connecting Channels and Harbors Study (GLCCHS) in 1977. In March of 1977, the Regional Director for FWS, Region 3, Twin Cities, Minnesota, submitted comments to the Detroit District Corps of Engineers (COE) which provided FWS evaluations of earlier FWS comments and recommendations on channel modifications of the interconnecting waterways of the Great Lakes by the COE.

In April 1978, we prepared a Planning Aid Report (Stage I) to assist in the development of a revised Plan of Study. Our purpose was to provide FWS views on biological studies and to recommend the manner in which the GLCCHS and subsequent project proposals should address the Great Lakes aquatic ecosystem. A major FWS recommendation stemming from the April report was to establish an "environmental task force" to assess the potential impact of the GLCCHS.

In September 1978, we provided comments to the Detroit District, COE on the Revised Plan of Study, May 1978, GLCCHS. We reiterated our comments that an environmental "task force" approach be taken and two-phased authorization be selected by the Corps.

The FWS prepared its first Letter Report for Stage II documentation in November 1979. The basic terms of the FWS/COE Scope of Work required documentation of fish-spawning sites in various project areas, and provided FWS evaluations and recommendations regarding the potential environmental impacts of the proposed alternatives. We recommended that an environmental "task force" approach be used and that a non-deepening or widening alternative be selected.

In November of 1980, the FWS prepared a second letter report for Stage II documentation. The function of this study was to provide information to the Corps to aid in selecting a project alternative which is environmentally feasible or least damaging. By a closely coordinated FWS/State effort, those aquatic and/or terrestrial areas and communities likely to be impacted by the proposed alternatives were identified.

The FWS effort for FY 1981 centered on developing an extensive and comprehensive Stage II Environmental Assessment of the GLCCHS. The final report was a culmination of efforts of seven FWS field offices (East Lansing, Michigan; Columbus, Ohio; Bloomington, Indiana; Cortland, New York; Rock Island, Illinois; Green Bay, Wisconsin; and St. Paul, Minnesota).

The FWS input for FY 1982 centered on supplementing the FY 1981 report with environmental information on five additional harbors (Taconite Harbor and Silver Bay Harbor, Minnesota; St. Clair and Muskegon Harbor, Michigan; and Erie Harbor, Pennsylvania).

The GLCCHS Statement of Work (SOW) for FY 1982 also required that the FWS conduct a field reconnaissance (Objective C) of sites selected for COE Stage III planning for this project. During Stage II documentation, the COE determined that the study area for this effort was to be the St. Marys River, above the navigation locks at Sault Ste. Marie, Michigan.

Among the alternatives the COE has been considering for Stage III are deepening the upper St. Marys River navigation channel and construction of a second large lock (Poe size - 1250 feet by 115 feet) at Sault Ste. Marie, Michigan, to accommodate existing and projected larger size vessels. In order to help characterize that portion of the upper St. Marys River being considered for modification, the FWS was requested to collect qualitative data on benthic macroinvertebrates, aquatic macrophytes, and larval and adult fish.

Initially, the study area was to include the Vidal Shoals navigation course immediately above the Soo Locks. In Spring 1982, the study area was extended to the Point Iroquois Shoals vicinity (Birch Point Course).

Through coordination between the FWS and COE, we agreed that our efforts should primarily be concerned with the permanent loss of habitat. Thus, we concentrated on benthic and other biological characteristics of the near channel area. This decision was based on both our preliminary understanding of likely perturbations to the ecosystem and constraints on our sampling and analysis efforts, such as time and equipment available.

As designing of sampling schemes and preparations for the field reconnaissance progressed, macrobenthos sampling and analysis would became a major focus of our efforts. We agreed to prepare a report on our findings on macrobenthos under a separate cover. This report, therefore, will only address our work completed on larval fish, aquatic macrophytes, and adult fish.

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ACKNOWLEDGMENTS

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INTRODUCTION

Description of the Area

The St. Marys River is the single outflow of Lake Superior to the lower Great Lakes. From its headwaters at Whitefish Bay to its mouth at Lake Huron, it flows about 120.7 km (75 miles) and descends approximately 22 feet. Providing a natural boundry between the United States and Canada, it is bounded by the eastern edge of Michigan's upper peninsula and by the Province of Ontario.

Most of the 22 foot fall of the St. Marys River occurs about 14 miles downstream from Whitefish Bay, at what remains of the historic St. Marys Rapids. The St. Marys River's flow is totally regulated at this point by man-made structures (power canal of the Great Lakes Power Corporation, the Canadian Ship Canal, the Compensating Works, the power canal of the U.S. Government power plant, the two U.S. ship canals which serve four navigation locks and the Edison Sault Electric Company's power canal). Below the rapids, the river falls about two feet before flowing into Lake Huron. The flow of the St. Marys River during the 74-year period between 1900-1973 has averaged 74,900 cubic feet per second (cfs) and ranged from a maximum of 127,000 cfs in August 1950, to a minimum of 41,000 cfs in September 1955 (International Lake Superior Board of Control, 1974).

Compensating works (consisting of 16 gates) are operated at the head of the St. Marys Rapids to maintain the monthly mean levels of Lake Superior between elevations of 600.5 and 602.0 feet. Regulation of lake levels is in accordance with the Orders of Approval of the International Joint Commission issued on May 26 and 27, 1914.

Generally, the St. Marys flows in a southeasterly direction forming numerous shallow bays along its main course. Four large islands (Sugar Island, Neebish Island, St. Joseph Island and Drummond Island) divide the river into several channels. These channels broaden out in several areas to form lakes (Lake George, Lake Nicolet and Lake Munuscong). Numerous creeks and small rivers with American or Canadian watersheds, drain into the St. Marys.

The major shipping link between the northwestern Great Lakes and metropolitan areas in the lower Great Lakes is through the St. Marys River system. Crude oil, petroleum products, grain, steel, coal, taconite and iron ore are the major cargoes shipped. Ship traffic may average over 12,000 vessels with cargoes of some 100,000,000 tons per year during high use years (Hamdy et al. 1978).

The St. Marys River possesses fish and wildlife riparian habitat that is unparalleled in the upper Great Lakes System. As the river meanders southward from its headwaters of Whitefish Bay to Lake Huron, it constricts and expands to augment diversity of the bottom substrate and aquatic medium. The bays and lakes that occur in the expanded portions of its course have extensive wetland areas. Seventy-six wetlands have been identified along the 116-mile stretch of U.S. shoreline (Hendendorf et. al, 1981).

The St. Marys River receives well-oxygenated, high quality cold waters from Lake Superior, and, with the exception of one reach, this high quality is maintained in the river. A long standing problem exists with the industrial and domestic discharges from the Candian side at Sault Ste. Marie, Ontario. The Algoma Steel Corporation, the Abitibi Power and Paper Company, the Mannesman Tube Company, Dominion Tar and Chemical Company and the City of Sault Ste. Marie, Ontario discharge either directly or indirectly into the river and seriously degrade the waters of the Canadian side. Segments of the St. Marys above these industrial sites, have good water quality. Downstream from this point, however, the Canadian side is seriously degraded. The degradation continues at least ten miles downstream into the north channel above Sugar Island and into Little Lake George. Pollutants discharged into the river include phenols, iron, cyanide, oil, wood fibers, ammonia, napthalene, and domestic sewage.

The Canadian pollution sources have not greatly affected the American side of the river. Water quality is good and the river supports a well-balanced and highly diverse flora and fauna. Descriptions and summaries of existing data and literature on biological and physical/chemical systems of the St. Marys River are presented by Liston et. al (1980 and 1982) and the FWS (1980).

Description of the Project

The United States has carried out various modifications to the St. Marys System for navigation purposes. The following summarizes those activities: 1) providing for a minimum width of 300 feet for one-way traffic and of 600 feet for two-way traffic; 2) dredging shoals from the mouth of the river to Lake Munuscong; 3) excavating two separate channels between Lake Munuscong and Lake Nicolet, one on each side of Neebish Island; 4) dredging through Lake Nicolet and the canals, including extension of the anchorage and maneuver area below the locks; 5) constructing compensating works; 6) deepening and widening the tailrace of the power plant; 7) constructing two canals, four locks and an emergency dam for each lock; 8) deepening the approach channels and reconstructing the approach piers; 9) widening the channel across Brush Point Turn and Point Iroquois Shoals; and 10) dredging through four shoals between the head of the falls and Lake Superior.

The size of the Poe Lock at Sault Ste. Marie and the existing regulation limits the maximum size vessel that can transit between Lake Superior and the lower lakes to 1,100 feet x 105 feet. In order to handle vessel sizes suggested by the Maximum Vessel Study, it would be necessary to dredge in the St. Marys River. Vessels drawing drafts of 28 feet or greater would require that dredging be performed throughout the channel sections described in the preceeding paragraph. Within the St. Marys River, it is possible that the West Neebish Channel would be modified in order that vessel traffic would become two-way. Accordingly, it is assumed that the Middle Neebish Channel would no longer be maintained for the main flow of vessel traffic.

Modifications of the connecting channels, or alternatives thereto, could require changes to the Soo Locks along the St. Marys River. The Detroit Corps District has developed eight major combinations of structural and non-structural alternatives, five of which involve the St. Marys River and/or the Federal Lock Facilities at Sault Ste. Marie. The five are as follows:

1. Construct new duplicate locks.
2. Deepen and/or widen harbors with new duplicate Poe Lock.
3. Deepen and/or widen both connecting channels and harbors without new lock.
4. Deepen and/or widen both connecting channels and harbors with new duplicate Poe Lock.
5. Deepen and/or widen both connecting channels and harbors with new larger lock.

It is our current understanding that the COE now plans to carry the following alternatives to the final detailed study stage (U.S. Army Corps of engineers, Detroit District, 1982):

-A second large lock (Poe size - 1250 by 115 feet), together with increased traffic control, at Sault Ste. Marie, Michigan, to accomodate the existing and projected fleet at the existing 27-foot project depth;

-Deepening the upper St. Marys River and three Lake Superior harbors plus traffic control;

-Enlarging the seven deep-draft harbors on the upper system that currently service class 10 (1000 feet by 105 feet) vessels;

-Analysis on a port-to-port basis deep-draft harbor pairs on Lake Michigan that could benefit from additional modifications beyond the existing 27-foot capacity system.

The GLCCHS is continuing into the final detailed study stage of the planning process (Stage III), and the Final Feasibility Report and Environmental Impact Statement are scheduled for completion in September 1985.

FWS FY 1982 Studies

Under the GLCCHS Statement of Work for FY 1982, the Detroit District, COE requested that the FWS conduct a field reconnaissance of the upper St. Marys River. It was agreed that efforts would be directed towards gathering qualitative data on benthic macroinvertebrates, aquatic macrophytes, and larval and adult fish occurring near the U.S. side of the shipping channel in an attempt to help characterize the biological communities in this part of the river.

As coordination efforts on this study progressed through FY 1982, personnel from the FWS and COE concurred that the benthic macroinvertebrates sampling should receive special consideration. This decision was reached based on our present lack of knowledge of the specific structural modifications which will be selected, our preliminary understanding of ecosystem perturbation (with permanent habitat loss likely to most directly impact the benthic community), and such constraints on our sampling and analysis efforts as time and equipment available. For these reasons we will be presenting our findings on macrobenthos under a separate report.

specifically, the navigation channel from the Soo Locks upstream to the Point Iroquois Shoals area, and those areas in proximity to the shipping channel on the U.S. side (Figures 1 and 2). The river in this area flows in a southeastern direction out of Whitefish Bay, and then turns in the vicinity of Round Island to the east, northeast to the Soo Locks. The navigation channels are titled as follows going downstream from Point Iroquois Shoals: Birch Point Course, Brush Point Course, Point Louise Channel, Point Aux Pins Course and the Vidal Shoals Channel. The project area intails approximately 15 river miles.

Figure 1. Map of the Great Lakes System showing the general study area on the St. Marys River.

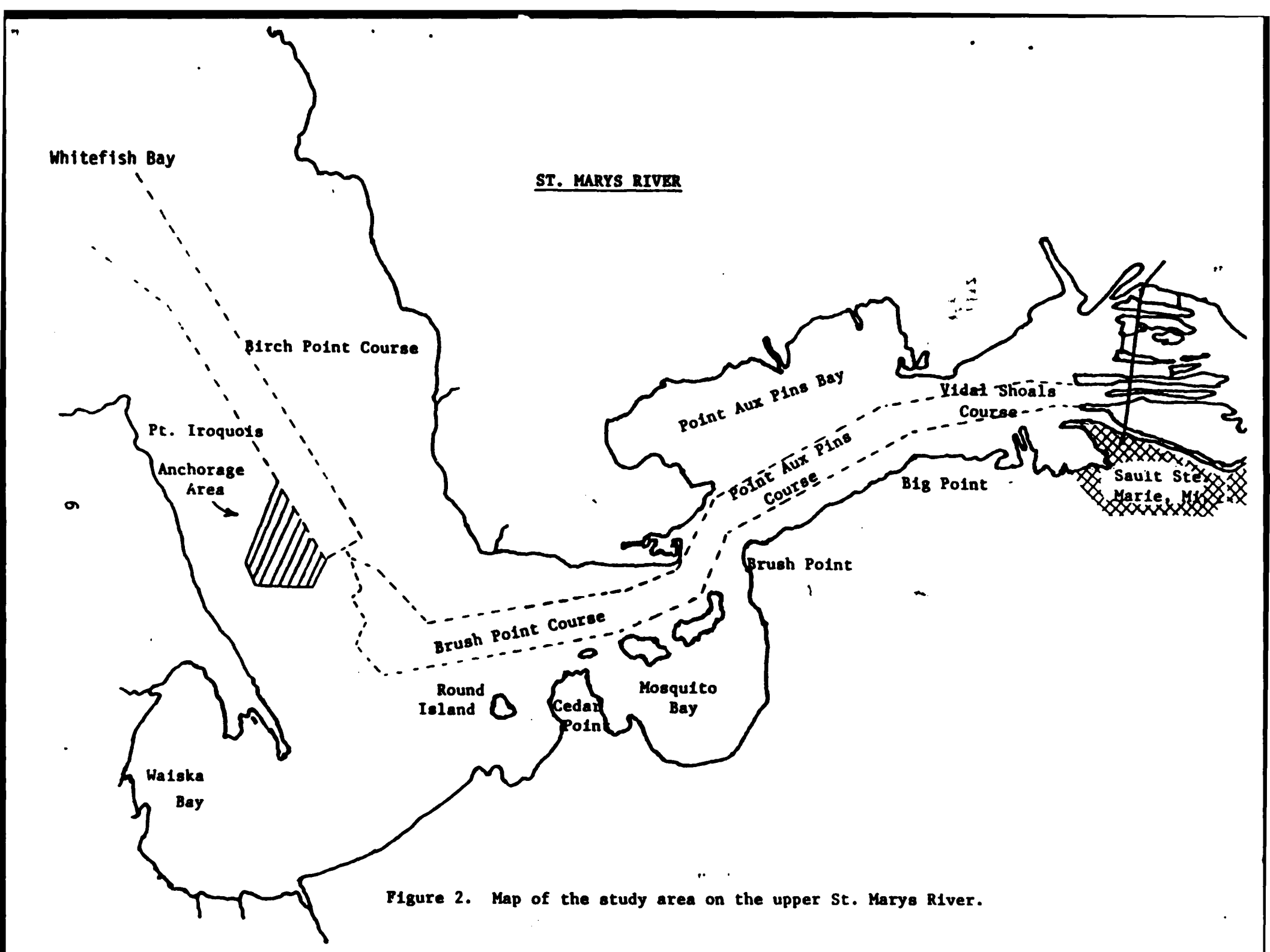

Figure 2. Map of the study area on the upper St. Marys River.

LARVAL FISH

Methods and Materials

Larval fish samples were collected at night at seven transects on the upper St. Marys River from May through September, 1982 (Figure 3, Table 4). Tows were made both in the navigation channel (sampling transects designated A) and out of the channel (sampling transects designated B) within aproximately 50 meters of the channel's edge. Two types of sampling gear were utilized in our collections. The majority of the sampling was conducted with a bridled 0.5 m Nitex conical plankton net with a 351 m mesh. A 0.5 m cylinder-on-cone plankton net constructed of 355 Nitex mesh was also used. This net was modified specifically for larval fish sampling by the FWS's Great Lakes Fishery Laboratory (GLFL).

Each tow was a minimum of five minutes duration, in a stepped oblique fashion with a minimum sampling time of 1 1/2 minutes near the bottom, at mid-depth and the surface. The net was towed into the current behind a 16 foot Boston Whaler. Sampling depth was regulated by towing at a set rpm and adjusting the length of the cable tow line (a method developed by the FWS GLFL).

Upon completion of a tow, the net was washed down and the contents of the collection bucket were preserved in glass jars in 10% formalin.

Measurements and field observations were recorded on time of sampling, duration of tow, depth and water surface temperatures (Appendix A).

Analysis of Samples

Samples were sorted using both a black pan and a clear pyrex dish. Fish larvae were sorted into ten dram vials containing modified Davidson's solution. All other organisms were also sorted, counted, and preserved in 10% formalin (Appendix A).

Identification of fish larvae were made by Diane E. Ashton (Graduate Student, Michigan State University). Specimens were identified to the lowest taxon possible, counted, and measured to the nearest 0.1 mm (Appendix A).

Results

A total of 49 fish larvae were collected in 24 samples from the seven larval fish transects sampled in May, July, and September, 1982. Larvae of seven taxa were collected, with rainbow smelt being the most abundant (45% of the total catch).

Sampling transects L5, L6, L4, and L3 produced the most fish larvae, and with the exception of transect L3, more larvae were collected in the out-of-channel transects (Table 3). All of the fish larvae collected were from the July sampling trip, except the lake whitefish which was collected on May 27, 1982.

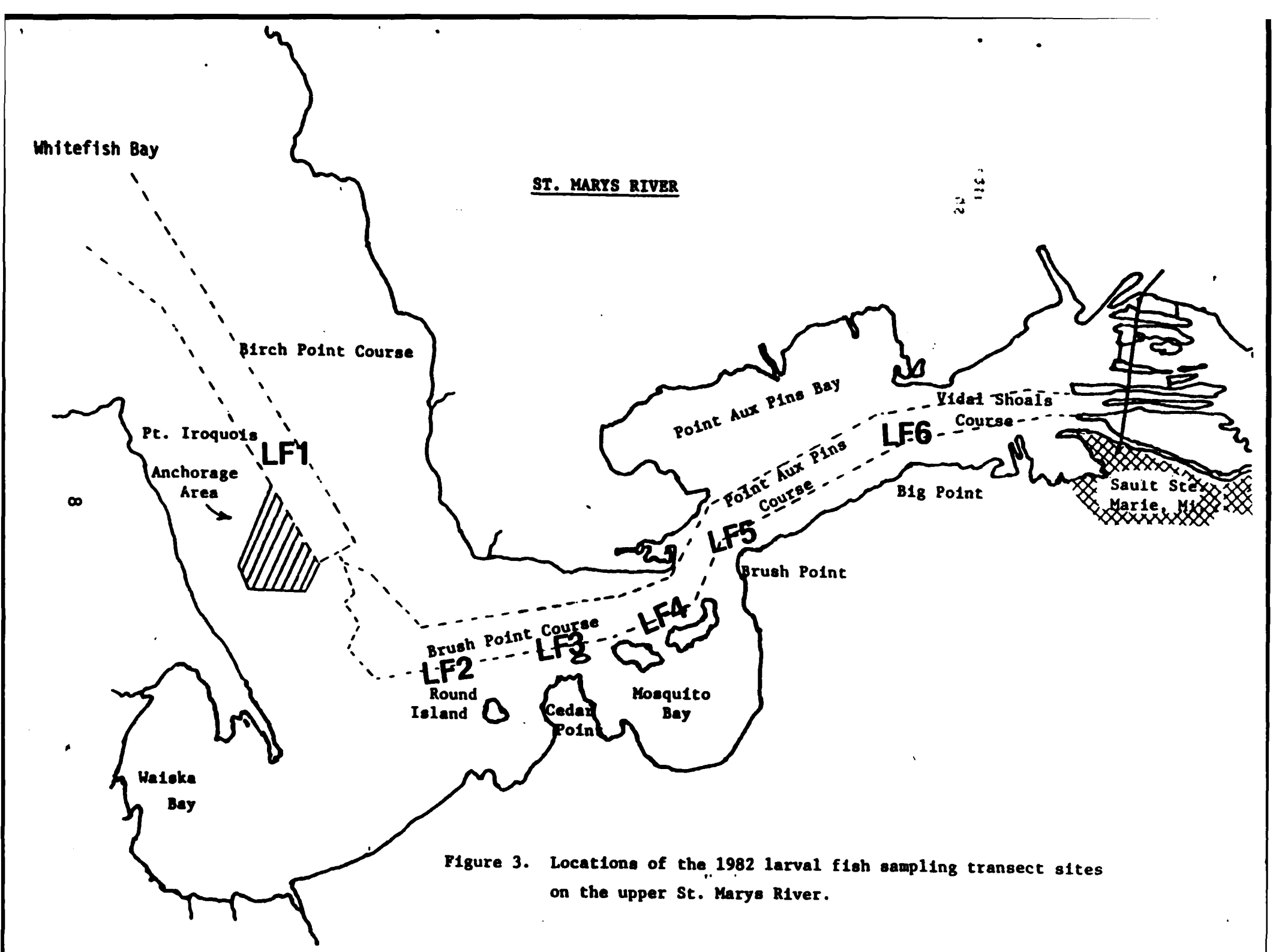

Figure 3. Locations of the 1982 larval fish sampling transect sites on the upper St. Marys River.

Table 1. List of fish larvae collected in St. Marys River, May and July, 1982

Scientific Name	Common Name
Salmonidae	Salmons, trouts, whitefishes
Coregonus clupeaformis	Lake whitefish
Osmeridae	Smelts
Osmerus mordax	Rainbow smelt
Gadidae	Codfishes
Lota lota	Burbot
Gasterosteidae	Sticklebacks
Pungitius pungitius	Ninespine stickleback
Percidae	Perches
Etheostoma sp.	Unidentified darter
Percina caprodes	Logperch
Cottidae	Sculpins
Cottus sp.	Unidentified sculpin

Table 2. Total number of fish larvae collected in St. Marys River, May and July, 1982.

Taxon	Number	% Total Catch
Lake whitefish	1	2
Rainbow smelt	21	43
Burbot	1	2
Ninespine stickleback	11	22
Etheostoma sp.	11	22
Logperch	1	2
Cottus sp.	3	6
TOTAL	49	99

Table 3. Total number of fish larvae collected by sampling transect in the St. Marys River during 1982.

Samplings Transect	L1A	L1B	L2A	L2B	L3A	L3B	L4A	L4B	L5A	L5B	L6A	L6B	L7A	L7B
Taxon	Number of Larval Fish Collected													
Lake whitefish	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rainbow smelt	0	0	0	0	1	0	0	2	2	8	3	5	0	0
Burbot	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ninespine stickleback	0	0	0	0	2	0	0	2	4	2	0	1	0	0
Etheostoma sp.	0	0	0	0	0	0	0	3	3	4	0	1	0	0
Logperch	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Cottus sp.	0	0	0	0	2	0	0	0	1	0	0	0	0	0
TOTAL	0	0	0	0	6	0	0	8	10	14	3	7	0	1

JUVENILE AND ADULT FISH

Methods and Materials

Sampling stations were established at six sites on the upper St. Marys River (Figure 4). Experimental gill nets were employed to collect juvenile and adult fish near the navigation channels at each station.

Most of the sampling was conducted with 475 foot gangs of experimental gill nets. Each gill net gang consisted of 25-foot panels with No. 69 twine size stret nylon mesh, with mesh sizes ranging from 1 1/4" up to 6". The 800-foot net gangs were provided by the FWS's GLFL. They attached sets of nets used for chub sampling to those used in their lake trout sampling efforts. Mesh size ranged from 1" to 6". The nets were set for periods ranging from 15 1/2 hours, up to 48 1/2 hours (Table 5).

Two attempts were made to use an otter trawl (bottom trawl), to collect juvenile fish. This equipment proved incompatible with the boat available to us at that time. Because of this situation and time limitations, we decided to delete this effort.

Analysis of Collections

The total number, weights, and total lengths for each species were recorded from all collections. When possible, the fish were also sexed and condition of gonads were recorded. Concurrent measurements and observations on times nets were set and lifted, secchi disc readings, bottom and surface temperatures, and weather and sea conditions were also recorded (Appendix B). Scale samples from seven representative species were also taken.

Results

A total of 200 fish composed of 16 species were collected in 14 bottom gill nets set in June, July, and September, 1982 (Tables 5 through 8). White sucker was found to be the dominant species, comprising 28.6% of the catch with yellow perch and rainbow smelt contributing 25.1% and 18.1% respectively. Northern pike (8%), lake whitefish (15%) and redhorse sucker (12%) also were significant in terms of numbers collected.

By weight, northern pike comprised 35% of the total catch. They were followed by white sucker (30.6%) and yellow perch (11.5%) (Table 8).

Fish were collected in greatest numbers at station F5. Stations F4, F2, F3, and F1 followed in order (Table 6). Table 7 summarizes and compares the numbers of species collected by station and date.

Thirty to forty crayfish were observed in our June gill net collection from station F5. They had been apparently been feeding on the rainbow smelt captured by the net, as many of these fish were headless when the net was retrieved. The June collections from stations F4 and F3 also contained crayfish (two to four per net). One freshwater mussel, Anodonta grandis, was taken in the June gill net collection from station F4.

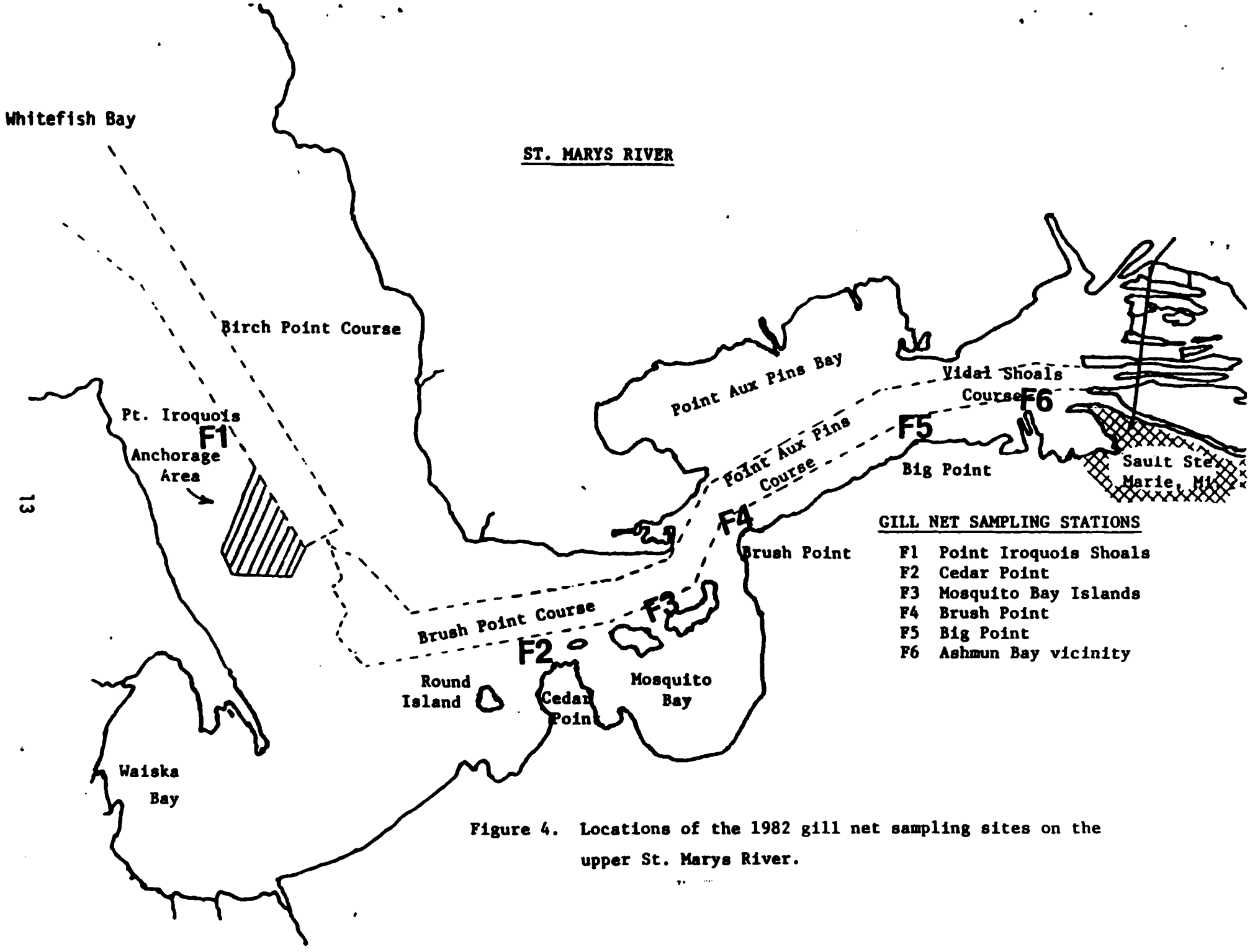

Figure 4. Locations of the 1982 gill net sampling sites on the upper St. Marys River.

Table 4. Summary of Larval Fish Transects, dates sampled, and water surface temperatures (°F) at time of Sampling.

TRANSECT	L1A	L1B	L2A	L2B	L3A	L3B	L4A	L4B	L5A	L5B	L6A	L6B	L7A
Sampling Date													
5-25-82	40	39											
5-26-82			42	42	44	46		47					
5-27-82							43		43	49	48	46	44
7-28-82											54		
7-29-82					63		63	63	64	64		54	
9-22-82	57	57				57							

Table 5. Summary of gill net sampling in the St. Marys River during June, July, and September, 1982.

STATION	DATE SET	TIME SET	DATE RETRIEVED	TIME RETRIEVED	AMOUNT OF EFFORT	AMOUNT OF NET
F4	6-14-82	21:00	6-15-82	19:00	22 hrs.	800'
F4	6-15-82	20:00	6-17-82	11:30	39 hrs., 30 min.	800'
F5	6-15-82	13:40	6-17-82	14:15	48 hrs., 35 min.	475'
F3	6-15-82	15:20	6-16-82	15:30	24 hrs., 10 min.	475'
F3	6-16-82	15:45	6-17-82	12:45	21 hrs.	475'
F1	6-15-82	17:50	6-16-82	22:30	28 hrs., 40 min.	800'
F3	7-27-82	16:30	7-28-82	15:10	22 hrs., 40 min.	475'
F2	7-26-82	18:45	7-27-82	14:50	20 hrs., 5 min.	475'
F3	7-26-82	19:15	7-27-82	15:50	20 hrs., 35 min.	475'
F2	7-27-82	15:30	7-28-82	14:10	22 hrs., 40 min.	475'
F6	9-21-82	20:30	9-22-82	12:00	15 hrs., 30 min.	475'
F6	9-21-82	21:00	9-22-82	13:00	16 hrs.	475'
F1	9-22-82	14:00	9-23-82	12:15	22 hrs., 15 min.	475'
F1	9-22-82	14:30	9-23-82	13:00	22 hrs., 30 mon.	475'

Table 6. Total number of adult fish collected during gill net sampling, by station, in the St. Marys River, 1982.

STATION / TAXON	F1	F2	F3	F4	F5	F6	TOTAL
White sucker	1	10	8	19	18	0	57
Yellow perch	0	0	2	7	41	0	51
Rainbow smelt	3	0	1	2	30	0	36
Northern pike	0	10	3	1	2	0	16
Lake whitefish	7	0	1	6	1	0	15
Redhorse sucker	0	0	2	8	2	0	12
Lake trout	3	0	0	0	0	0	3
Alewife	2	0	0	0	0	0	2
Coho salmon	0	0	1	0	0	0	1
Unidentified salmon	0	0	0	1	0	0	1
Trout perch	0	0	1	0	0	0	1
Black crappie	0	0	0	1	0	0	1
Channel catfish	0	0	0	0	1	0	1
Spottail shiner	0	0	0	0	1	0	1
Rock bass	0	0	0	0	0	1	1
Carp sucker	0	1	0	0	0	0	1
TOTAL	16	21	19	45	96	0	200

Table 7. Summary of gill net sampling by station and date in the St. Marys River, 1982.

		TAXON																
STATION	DATE (Number of sets)	White sucker	Yellow perch	Rainbow smelt	Northern pike	Lake whitefish	Redhorse sucker	Lake trout	Alewife	Coho salmon	Unidentified salmon	Trout perch	Black crappie	Channel catfish	Spottail shiner	Rock bass	Carp sucker	TOTAL
F1	June (1)	0	0	0	0	5	0	3	0	0	0	0	0	0	0	0	0	8
	September (2)	1	0	3	0	2	0	0	2	0	0	0	0	0	0	0	0	8
F2	July (2)	10	0	0	10	0	0	0	0	0	0	0	0	0	0	0	1	21
F3	June (2)	1	1	1	1	0	2	0	0	1	0	0	0	0	0	0	0	7
	July (2)	7	1	0	2	1	0	0	0	0	0	1	0	0	0	0	0	12
F4	June (2)	19	7	2	1	6	8	0	0	0	1	0	1	0	0	0	0	45
F5	June (1)	18	41	30	2	1	2	0	0	0	0	0	0	1	1	0	0	96
F6	September (2)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
TOTAL		57	51	36	16	15	12	3	2	1	1	1	1	1	1	1	1	200

Table 8. Summary of all gill net collections taken in the St. Marys River during June, July, and September, 1982

Species	Total Number	Percent of Total Number	Total Weight (kg)	Percent of Total Weight
White sucker	57	28.5	43.95	30.6
Yellow perch	51	25.5	16.52	11.5
Rainbow smelt	36	18.0	3.6	2.5
Northern pike	16	8.0	51.75	36.0
Lake whitefish	15	7.5	8.16	5.7
Redhorse sucker	12	6.0	6.76	4.7
Lake trout	3	1.5	5.8	4.0
Alewife	2	1.0	0.25	0.2
Coho salmon	1	0.5	2.6	1.8
Unidentified salmon	1	0.5	0.19	0.1
Trout perch	1	0.5	<0.1	0.1
Black crappie	1	0.5	0.25	0.2
Channel catfish	1	0.5	2.5	1.7
Spottail shiner	1	0.5	0.1	0.1
Rock bass	1	0.5	0.2	0.1
Carp sucker	1	0.5	1.0	0.1
TOTAL	200	100	143.73	100

AQUATIC MACROPHYTES

Methods and Materials

In August and September we attempted to identify the distribution of rooted aquatic macrophytes within 100 meters of the U.S. side of the navigation channel. This was done by conducting a visual survey of the study area from a 16-foot Boston Whaler. When macrophyte beds were located, field observations were recorded on their location, depths, and estimates were made of the bed size and percent cover. A grappling hook was fashioned and random plant specimens were collected and preserved for identification.

Results

Figure 5 delineates areas where submerged aquatic macrophytes were observed. No emergent aquatic macrophytes were noted within the confines of the study area.

The area that had the most extensive submerged aquatic macrophytes that we were able to observe appeared to follow a drop-off (depth contour of three to five meters) running parallel to the navigation channel. This narrow band (one to three meters) of rooted plants appeared to be restricted to depths that ranged from three to five meters. This narrow band of macrophytes was quite continuous from the area beginning between the Mosquito Bay (Izaak Walton Bay) spoil islands and the navigation channel, and follwed the drop-off downstream to the Brusn Point vicinity.

Between Brush Point and Big Point, this band of macrophytes became much more sporadic. Our ability to visually observe the macrophytes in areas downstream was reduced by increased turbidity that occurred during the survey.

The only other submerged macrophytes visually observable were also located between the Mosquito Bay spoil islands and the navigation channel. There were several (10-15) "patches" or "clumps" of relatively small macrophyte beds, ranging in size from ten to 30 square meters.

Most plant specimens within the observed macrophyte beds were less than one meter in length with many having the appearance of being sheared off (possibly by some physical process) two or three centimeters above the substrate. Those plant specimens that were collected are presented in Table 9. Species from six taxa were collected, most of which were either pondweed (Potomogeton) or charaphytes.

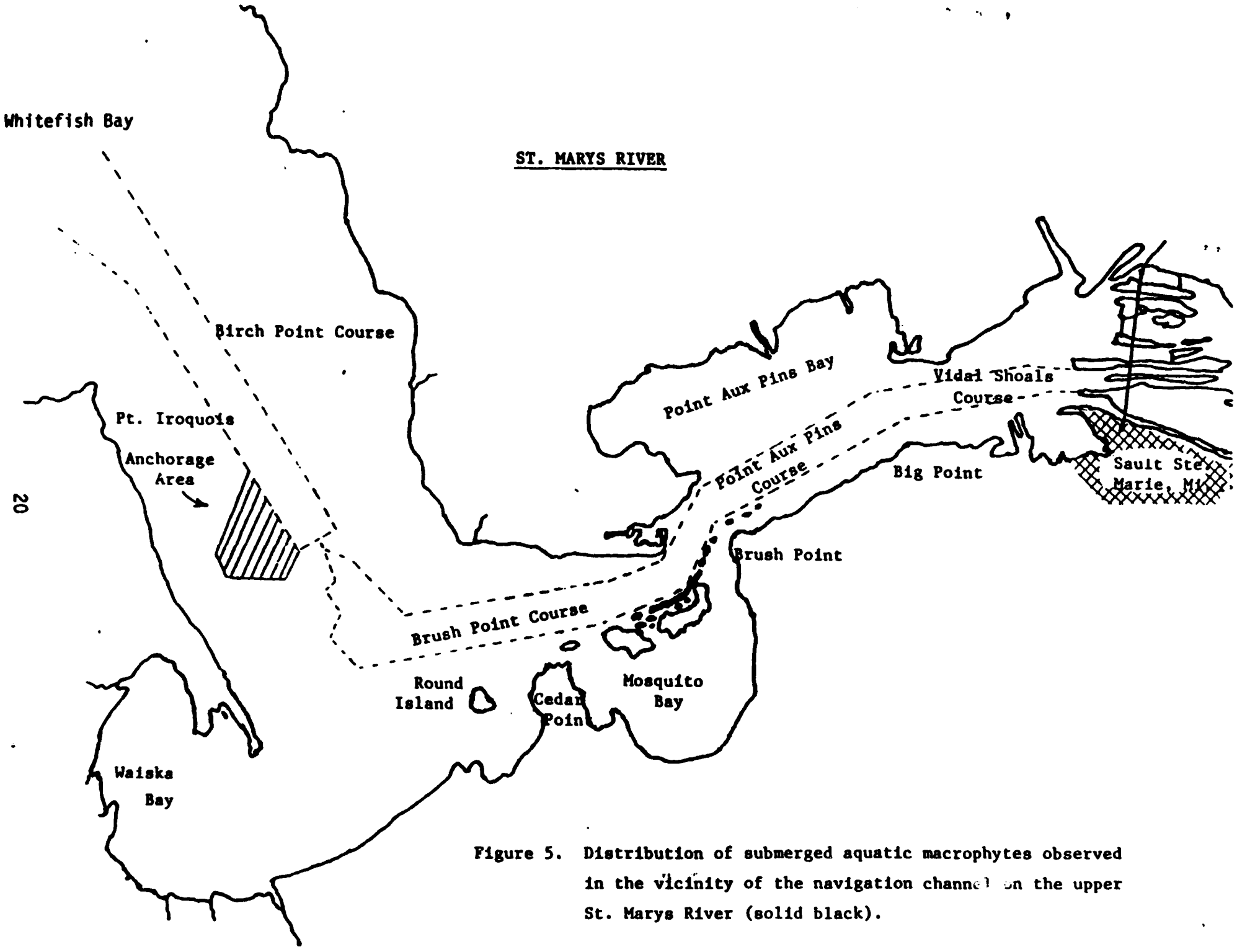

Figure 5. Distribution of submerged aquatic macrophytes observed in the vicinity of the navigation channel on the upper St. Marys River (solid black).

Table 9. List of aquatic plant species collected during the September, 1982 survey of aquatic macrophytes within 100 meters of the navigation channel on the upper St. Marys River.

Potomogeton praelongus

Potomogeton richardsonii

Potomogeton robbinsii

Nitella flexilis

Tolypella intricata

Chara sp.

SUMMARY

The feasibility of deepening the navigation channel in the upper St. Marys River will be evaluated by the U.S. Army Corps of Engineers, Detroit District in the final detailed study stage of the planning process for the GLCCHS. To help facilitate characterization of this portion of the St. Marys River, qualitative data was collected on larval, juvenile and adult fish and a visual survey on the distribution of rooted aquatic macrophytes was conducted.

Larval fish were sampled at night at seven duplicate transects (both adjacent to and within the navigation channel) in the upper St. Marys River. A total of 49 fish larvae were collected in the 24 samples taken. Larvae of seven taxa were collected, with rainbow smelt being the most abundant.

A total of 200 juvenile and adult fish composed of 16 species were collected in 14 gill net samples: White sucker, yellow perch, and rainbow smelt were the most abundantly captured species.

A visual survey was conducted for rooted aquatic macrophytes within 100 meters of the navigation channel. Their distribution was mapped, and six species of plants were identified from a random sampling of the macrophyte beds.

Despite the very qualitative nature of this biological information, and the relatively sparce existing information, it is evident that this portion of the St. Marys River is important in supporting a diverse and rich flora and fauna. The results of this effort indicate that the habitats present in the upper St. Marys River have the capability to provide many varied life history requirements for many important fish and wildlife resources.

The concerns that we expressed in previous reports (FWS 1981) regarding environmental impacts to the St. Marys System resulting from the dredging/disposal and operation of larger and/or deeper draft vessels alternatives, are supported by these results for the upper St. Marys River.

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